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CH2M HILL Mound, Inc.
1075 Mound Road
P.O. Box 750
Miamisburg, OH 45343-0750

CH2MHILL

SMO-185/06
March 15, 2006

Mr. Don Pfister, Director
Miamisburg Closure Project
U. S. Department of Energy
175 Tri-County Parkway
Springdale, OH 45246

ATTENTION: Paul Lucas

SUBJECT: **Contract No. DE-AC24-03OH20152:** Deliverable #39 Potential release site and removal action documentation; Section C.2.3.1.3 Remaining Response Actions; PRS 69 OSC Report, Final

Dear Mr. Pfister:

Attached is the following Final document for your records:

- PRS 69 OSC Report, Final

If you or members of your staff have any questions regarding the document, or if additional support is needed, please contact Dave Rakel at 937-865-4203.

Sincerely,

Michael D. Ebben
Site Manager

JL/jg

Enclosures

cc: T. Fischer, USEPA, (1) w/attachments
B. Nickel, OEPA, (1) w/attachments
R. Vandegrift, ODH, (1) w/attachments
J. Webb, ODH, (1) w/attachments
M. Wojciechowski, Tetra Tech, (1) w/attach
G. Gorsuch, DOE/MCP, (1) w/attachments
R. Tormey, DOE/OH, (1) w/attachments
G. Desai, DOE/HQ, (1) w/attachments
C. Kline, CH2M Hill, (1) w/attachments
F. Bullock, MMCIC (2) w/attachments
Public Reading Room (1) w/attachments
Admin Records, CH2M Hill, (2) w/attachs
ER Records, CH2M Hill, (1) w/attachs
DCC (1) w/attachments
M. Ebben, CH2M Hill, w/o attachments
K. Armstrong, CH2M Hill, w/o attachments
D. Rakel, CH2M Hill, w/o attachments
D. Kramer, CH2M Hill, w/o attachments
J. Fontaine, CH2M Hill, w/o attachments
MOAT Coordinator, CH2M Hill, w/o attachs
S. Barr, CH2M Hill, w/o attachments
M. McDougal, CH2M Hill, w/o attachments
file, CH2M Hill, w/o attachments

PRS 69
REMOVAL ACTION

OSC REPORT

March 2006

Final

Department of Energy
Miamisburg Closure Project

CH2MHILL

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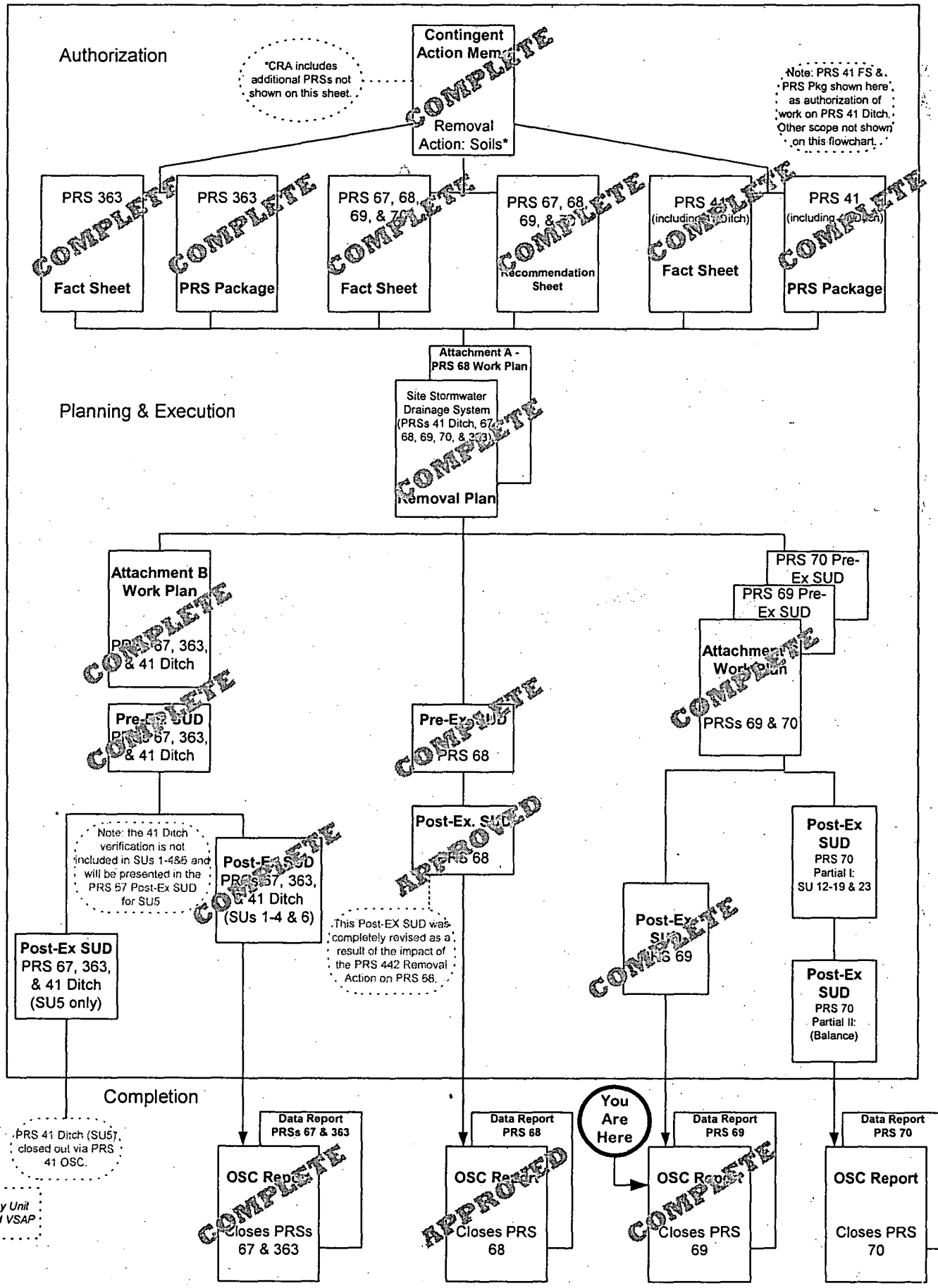

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Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO	cleanup objective
COC	contaminant of concern
DOE	Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
HS	hot spot
MCP	Miamisburg Closure Project
OEPA	Ohio Environmental Protection Agency
OSC	On-Scene Coordinator
PRP	Potentially Responsible Parties
PRS	Potential Release Site
RA	Removal Action
RBGV	Risk-Based Guideline Value
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
VSAP	Verification Sampling and Analysis Plan

RECOMMENDATION: PRS 69

The PRS 69 Removal Action was authorized via the Contingent **Action Memo**. (Action Memorandum EE/CA, Contingent Removal Action for Contaminated Soil, Final, June 2002) and Public **Fact Sheet** for PRSs 67-70: Site Stormwater Drainage System, Final, March 2005. PRSs 67, 68, and 70 are not included in this OSC Report. The RA (sampling only) was based on historical processes and a soil sample result which showed elevated levels of Th-232.

Removal of soil was not required. Verification sampling and analysis was performed in accordance with the Standard Soils Verification Sampling & Analysis Plan (**VSAP**), Final, August 2004 to demonstrate that the remaining soil meets the cleanup criteria.

This removal action was successfully completed and resulted in verification that PRS 69 meets the cleanup criteria.

The contaminant of concern (COC) was Th-232. All results are below COs; therefore the cleanup criteria are met.

After a thorough review of the PRS 69 OSC Report, the Core Team agrees that the PRS 69 Removal Action is complete, and that all previously existing environmental issues associated with the PRS 69 Removal Action have been resolved.

Paul Lucas 1/12/06

Paul Lucas, OSC
U.S. Department of Energy
Springdale, Ohio

Timothy J. Fischer 1/12/06

Timothy J. Fischer, Remedial Project Manager
USEPA
Chicago, Illinois

1/11/06

Brian Nickel, Project Manager
OEPA
Dayton, Ohio

1.0 SUMMARY OF EVENTS

This section describes the site background and events leading up to the removal action (RA), parties involved in responding to the RA, cleanup objective (CO) determination, chronological narrative of the RA, and resources committed to complete the projects.

1.1 Site Conditions and Background

Potential Release Site (PRS) 69 is the overflow pond and outfall pipe located at the southern portion of the onsite drainage ditch. PRS 69 was used to retain stormwater flows, settle sediment, and support compliance with the National Pollutant Discharge Elimination System discharge standards for suspended solids.

The levels of radiological contamination present at Potential Release Site (PRS) 69 warranted a RA under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act).

The PRS 69 Removal Action was authorized via the Contingent **Action Memo**, (Action Memorandum EE/CA, Contingent Removal Action for Contaminated Soil, Final, June 2002) and Public **Fact Sheet** for PRSs 67-70: Site Stormwater Drainage System, Final, March 2005. PRSs 67, 68, and 70 are not included in this OSC (On-Scene Coordinator) Report.

This OSC Report documents verification sampling at PRS 69 that confirmed removal of contaminated soil was not required. PRS 69 is shown on Figure 1 (A7/40). Verification sampling and analysis was performed in accordance with the Standard Soils Verification Sampling & Analysis Plan (**VSAP**), Final, August 2004 to demonstrate that the remaining soil meets the cleanup criteria.

Since the Department of Energy (DOE) is the sole responsible party for cleanup of PRS 69 soil contamination, no Potentially Responsible Parties (PRPs) were sought to clean up the site. Monsanto Research Corporation, EG&G Mound Applied technologies, and BWXT of Ohio, Inc were the operating contractors at the site from 1948 to 30 September 1988, from 1 October 1988 until 30 September 1997, and from 1 October 1997 until 31 December 2002 respectively. CH2M Hill Mound, Inc. became the site contractor for the Miamisburg Closure Project (MCP) effective January 1, 2003.

1.2 Organization of the Removal Actions

Table 1 lists the parties responding to the removal action, and their responsibilities.

Table 1: Organization of the Removal Action

US Environmental Protection Agency (USEPA) SFR-5J 77 W. Jackson Street Chicago, IL 60604 312-353-2000	Timothy J. Fischer	Federal agency responsible for oversight
Ohio Environmental Protection Agency (OEPA) 401 E. Fifth Street Dayton, OH 45402-2911 937-285-6357	Brian K. Nickel	State agency responsible for oversight
US Dept. of Energy Miamisburg Closure Project 175 Tri-County Parkway Springdale, OH 45246 513-246-0071	Paul Lucas	On-scene Coordinator responsible for oversight and success
CH2M HILL Environmental Restoration Project 1 Mound Road Miamisburg, OH 45343-3030 937-608-8220	Jim Fontaine	Provide OSC with technical assistance, administrative support, field oversight, sample management, site safety, photo, site documentation, and preparation of the OSC Report

1.3 Objectives

The objectives of this OSC Report are to describe the PRS 69 RA fieldwork and document successful completion of the project.

Removal Action Objectives: The objectives for the removal action included:

- Project Planning
- Public Notification
- Site Preparation
- Excavation
- Verification
- Site Restoration
- Documentation of Completion

Verification sampling confirmed that removal of soil was not required. The cost breakdown of the removal action is presented in Table 2.

Table 2: Removal Cost

Cost Category	Cost ($)
Planning/Fieldwork/ Restoration/grading/seeding	40,000
Subcontractors (Verification Sampling, Analyses, & Data Validation)	26,000
Closure Documentation	40,000
Estimated Total Project Cost	**106,000**

The Cleanup Objective for contaminant of concern (COC) identified in the PRS 69 (Th-232) is presented in Table 3.

The **cleanup criteria** are satisfied if all verification sample results are below CO or all sample results are below hot spot (HS) criteria and the 95% UCL (upper confidence limit) for the area of interest is less than the CO and the data set passes the Sign test.

Table 3: Cleanup Criteria (pCi/g)

COC	Cleanup Objective	Hot Spot Criteria
Thorium-232	2.1	3.5

Cleanup Objective. All final verification results for PRS 69 were below their respective COs as identified in the Data Report, Table 1 (A10/40 – A14/40).

Hot Spot Criteria. The Hot Spot criteria (3 times the 10^{-5} RBGV [Risk-Based Guideline Value] + background) for the COC is presented in Table 3. There were no sample results that exceeded the hot spot criteria for any analyte.

1.4 Chronological Narrative of the Removal Actions

Table 4 presents a chronological narrative of events surrounding the PRS 69 RA.

2.0 EFFECTIVENESS OF THE REMOVAL ACTIONS

The PRS 69 removal action is complete, and the objectives of the Action Memorandum have been met. The limits of verification are identified on Figure 2 (see A8/40). Results of verification sampling and analysis are provided in Appendix A, and photographs of the site following sampling are provided in Appendix C.

Table 4: Chronology of RA

Timeframe	Activity
September 2004	Removal Plan (includes PRS 69) approved
March 2005	PRS 69 Fact Sheet approved
May 2005	PRS 69 verification sampling & analysis
October 2005	PRS 69 OSC Report prepared

2.1 Actions Taken by Mound Personnel

CH2M Hill Mound, Inc. personnel planned and performed the removal action oversight, monitoring, sampling, and analyses, and generated the documentation. Photographic

documentation is presented in Appendix C. The project met the removal action objectives (Section 1.3), as outlined in the Action Memorandum (Final, dated June 2002). CH2M Hill Mound, Inc. personnel prepared this OSC Report, which shows that the Removal Action objectives were achieved.

2.2 Actions Taken by Local, State, and Federal Agencies

The DOE/MCP, USEPA, and OEPA had oversight responsibility for the removal actions. The DOE/MCP was the lead agency for the RA and provided the funding and oversight for the RA. The USEPA and OEPA had oversight responsibility for the RA and review of the Action Memorandum and OSC Reports to ensure that the objectives are/were met.

2.3 Actions Taken by Subcontractors

Subcontractors involved in the project included:

- Weston Solutions, Inc. - performed site soil sampling and data management, and generated the data review and validation report.

3.0 DIFFICULTIES ENCOUNTERED

3.1 Items that Affect the Removal Actions

No difficulties were encountered during the removals.

3.2 Issues of Intergovernmental Coordination

All DOE/OEPA/USEPA interactions were good. The agencies were updated informally on a regular basis, and formally at monthly Core Team meetings. The Mound 2000 Process worked well. Splitting of samples with OEPA went well.

4.0 RECOMMENDATIONS

4.1 Means to Prevent a Recurrence

The contaminated soil was found to be below COs. Mound Removal Actions have regulator approved work plans, each of which has a section that addresses runon/runoff controls. In addition, the site Storm Water Pollution Prevention Plan applies to the entire site and is monitored by the Environmental Compliance and Analytical Services group. As a result of the removal and runon/runoff protection, spread of contamination is prevented. After the removal action and the CERCLA process for the parcel are complete, the area will be transferred from Federal to private ownership. All State and Federal disposal rules will apply.

ATTACHMENT A

DATA REPORT

DATA REPORT

PRS 69

March 2006

Rev. 1

Department of Energy

Miamisburg Closure Project

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Appendix E Statistical Information A27/40

Appendix F Data Review & Validation A30/40

Acronyms

COC	contaminant of concern
PRS	Potential Release Site
QC	quality control
RA	removal action
RSDS	Radiological Survey Data Sheet
R&V	review and validation
SUD	Survey Unit Design
VSAP	Verification Sampling and Analysis Plan

1.0 PURPOSE

This Data Report provides documentation of sampling activities specified in the following documents; required to close out Potential Release Site (PRS) 69 shown on Figure 1 (Appendix A):

- Standard VSAP, Verification Sampling and Analysis Plan, Final, August 2004, and
- PRS 69 Post-Ex SUD (Survey Unit Design), Draft Proposed Final, October 2005.

The purposes of this Data Report are to:

- document the verification of PRS 69,
- describe any variances to the VSAP, and
- present the analytical results.

2.0 DOCUMENT ORGANIZATION / SUMMARY

The PRS 69 removal action (RA) was verified as described in Section 3. Contaminants of concern (COCs) are identified in the Post-Ex SUD, an excerpt of which is included as Appendix C. Unless otherwise specified as a variance, sampling and analyses were conducted in accordance with the VSAP and Core Team-approved Post-Ex SUD.

3.0 FIELD ACTIVITIES

Verification sampling occurred in May 2005 and included collection of 20 sediment samples at locations shown on Figure 2. All samples were submitted for offsite isotopic thorium analysis via alpha spec. Results are reported in Table 1 (Appendix B), which includes cleanup objectives for comparison purposes. Sampling was performed in accordance with the Post-Ex SUD, and except of which is included in Appendix C. Documentation of the required walkover survey is provided on a Radiological Survey Data Sheet (RSDS) in Appendix D. Per the Standard VSAP, statistical information, provided in Appendix E, includes calculation of standard deviation, retroactive power curve, and recalculation of N (number of samples).

4.0 DATA REVIEW / VALIDATION

All data were reviewed and 10% of offsite data were validated.

Field and laboratory QC (quality control) were assessed as part of the data review and validation (R&V) process.

Documentation of review and validation (and related variances) is provided in Appendix F. Review and validation supports that the data are usable.

APPENDIX A

FIGURES

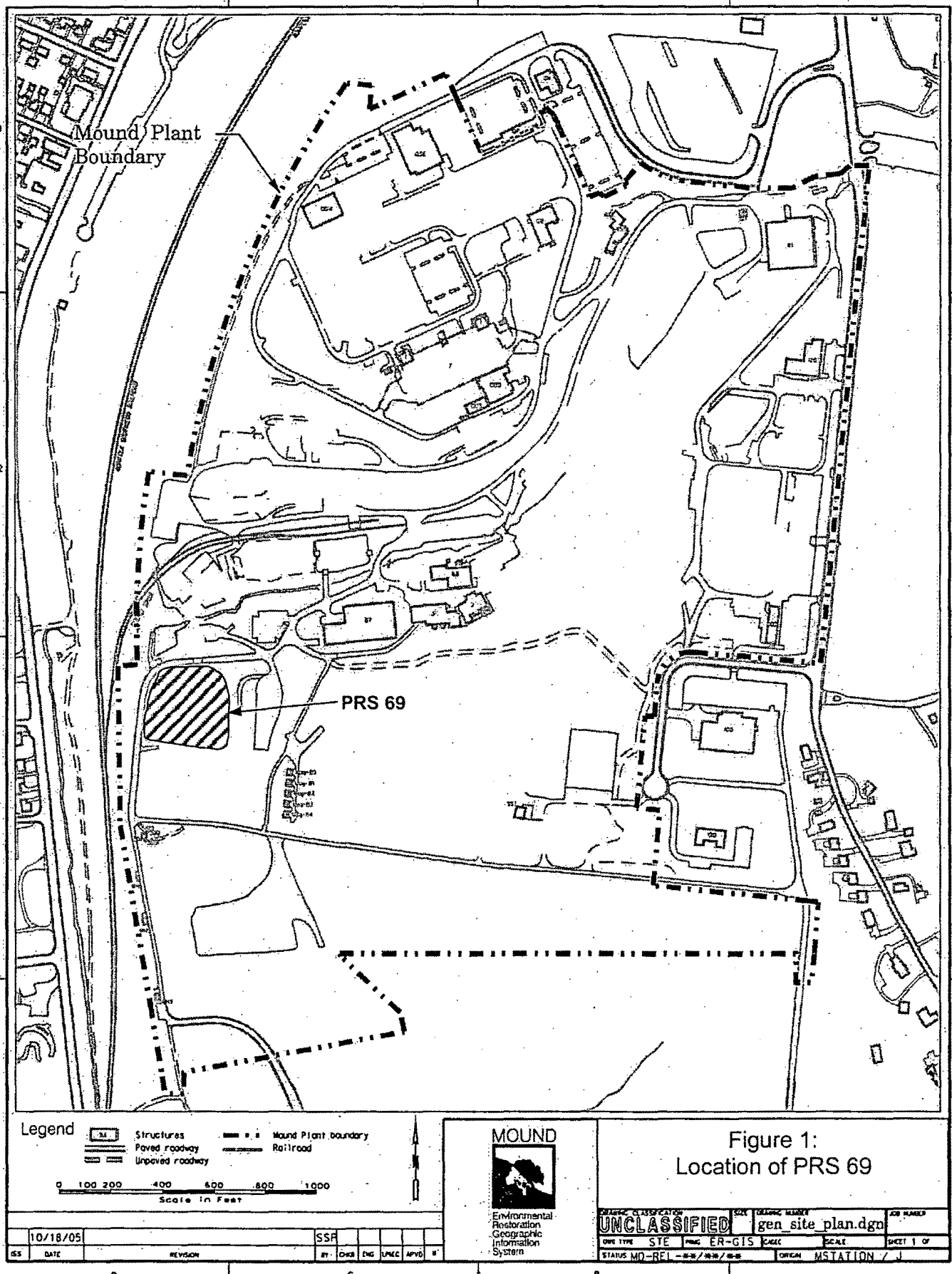
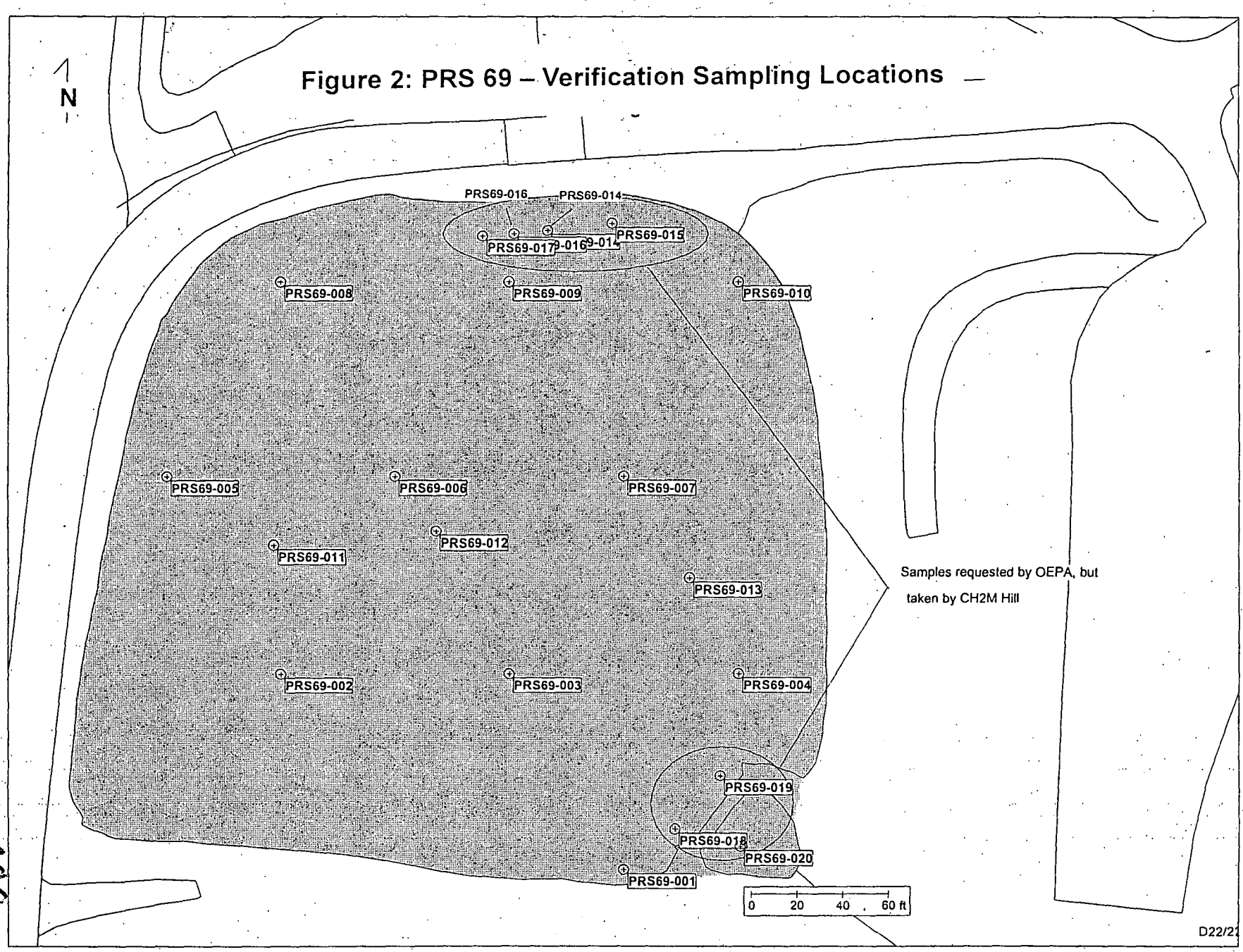


Figure 1:
Location of PRS 69

A7/40

Figure 2: PRS 69 – Verification Sampling Locations



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APPENDIX B

TABLES

Table 1: Verification Results (pCi/g)

[onsite gamma spec and offsite isotopic thorium, all results < CO]
[th-230 and th-232 superseded to that of offsite result for verification/statistical purposes]

Location	Date	Analyte	Result	Detection Limit	Data Qualifier	Lab Qualifier	Cleanup Objective	Northing	Easting
PRS69-001	20050523	Actinium-227	0.45	0.45		U	4.6	597285.2	1464207
PRS69-001	20050523	Americium-241	0.09	0.09			63	597285.2	1464207
PRS69-001	20050523	Cesium-137	0.07	0.07		U	3.8	597285.2	1464207
PRS69-001	20050523	Cobalt-60	0.07	0.07		U	0.7	597285.2	1464207
PRS69-001	20050523	Lead-210	1.48	0.96			7.4	597285.2	1464207
PRS69-001	20050523	Plutonium-238	17.58	17.58		U	55	597285.2	1464207
PRS69-001	20050523	Radium-226	2.05	0.88			2.9	597285.2	1464207
PRS69-001	20050523	Thorium-228	0.714	0.0214			2.6	597285.2	1464207
PRS69-001	20050523	Thorium-230	0.782	0.00673			2.8	597285.2	1464207
PRS69-001	20050523	Thorium-232	0.541	0.00673			2.1	597285.2	1464207
PRS69-002	20050523	Actinium-227	0.48	0.48		U	4.6	597372.3	1464056
PRS69-002	20050523	Americium-241	0.11	0.11		U	63	597372.3	1464056
PRS69-002	20050523	Cesium-137	0.08	0.07			3.8	597372.3	1464056
PRS69-002	20050523	Cobalt-60	0.09	0.09		U	0.7	597372.3	1464056
PRS69-002	20050523	Lead-210	1.26	0.88			7.4	597372.3	1464056
PRS69-002	20050523	Plutonium-238	17.1	16.84			55	597372.3	1464056
PRS69-002	20050523	Radium-226	1.55	0.99			2.9	597372.3	1464056
PRS69-002	20050523	Thorium-228	0.948	0.0118			2.6	597372.3	1464056
PRS69-002	20050523	Thorium-230	0.848	0.00804			2.8	597372.3	1464056
PRS69-002	20050523	Thorium-232	0.759	0.00804			2.1	597372.3	1464056
PRS69-003	20050523	Actinium-227	0.33	0.33		U	4.6	597372.3	1464157
PRS69-003	20050523	Americium-241	0.08	0.08		U	63	597372.3	1464157
PRS69-003	20050523	Cesium-137	0.1	0.05			3.8	597372.3	1464157
PRS69-003	20050523	Cobalt-60	0.06	0.06		U	0.7	597372.3	1464157
PRS69-003	20050523	Lead-210	1.8	0.77			7.4	597372.3	1464157
PRS69-003	20050523	Plutonium-238	12.83	12.83		U	55	597372.3	1464157
PRS69-003	20050523	Radium-226	1.29	0.71			2.9	597372.3	1464157
PRS69-003	20050523	Thorium-228	0.923	0.0216			2.6	597372.3	1464157
PRS69-003	20050523	Thorium-230	1	0.0068			2.8	597372.3	1464157
PRS69-003	20050523	Thorium-232	0.805	0.0151			2.1	597372.3	1464157
PRS69-004	20050523	Actinium-227	0.42	0.31			4.6	597372.3	1464258
PRS69-004	20050523	Americium-241	0.11	0.11		U	63	597372.3	1464258
PRS69-004	20050523	Cesium-137	0.09	0.06			3.8	597372.3	1464258
PRS69-004	20050523	Cobalt-60	0.08	0.08		U	0.7	597372.3	1464258
PRS69-004	20050523	Lead-210	2.62	0.92			7.4	597372.3	1464258
PRS69-004	20050523	Plutonium-238	19.53	19.53		U	55	597372.3	1464258
PRS69-004	20050523	Radium-226	1.49	0.96			2.9	597372.3	1464258
PRS69-004	20050523	Thorium-228	0.802	0.0182			2.6	597372.3	1464258
PRS69-004	20050523	Thorium-230	0.799	0.0161			2.8	597372.3	1464258
PRS69-004	20050523	Thorium-232	0.615	0.0115			2.1	597372.3	1464258
PRS69-005	20050523	Actinium-227	1.05	1.05		U	4.6	597459.4	1464006
PRS69-005	20050523	Americium-241	0.12	0.12		U	63	597459.4	1464006
PRS69-005	20050523	Cesium-137	0.13	0.06			3.8	597459.4	1464006
PRS69-005	20050523	Cobalt-60	0.11	0.11		U	0.7	597459.4	1464006
PRS69-005	20050523	Lead-210	2.35	1			7.4	597459.4	1464006
PRS69-005	20050523	Plutonium-238	21.07	21.07		U	55	597459.4	1464006

Table 1: Verification Results (pCi/g)

[onsite gamma spec and offsite isotopic thorium, all results < CO]
[th-230 and th-232 superseded to that of offsite result for verification/statistical purposes]

Location	Date	Analyte	Result	Detection Limit	Data Qualifier	Lab Qualifier	Cleanup Objective	Northing	Easting
PRS69-005	20050523	Radium-226	2.08	1.02			2.9	597459.4	1464006
PRS69-005	20050523	Thorium-228	0.93	0.0143			2.6	597459.4	1464006
PRS69-005	20050523	Thorium-230	1.25	0.0113			2.8	597459.4	1464006
PRS69-005	20050523	Thorium-232	0.805	0.0113			2.1	597459.4	1464006
PRS69-005D	20050523	Actinium-227	0.33	0.33		U	4.6	597459.4	1464006
PRS69-005D	20050523	Americium-241	0.09	0.08			63	597459.4	1464006
PRS69-005D	20050523	Cesium-137	0.12	0.06			3.8	597459.4	1464006
PRS69-005D	20050523	Cobalt-60	0.14	0.14		U	0.7	597459.4	1464006
PRS69-005D	20050523	Lead-210	2	0.89			7.4	597459.4	1464006
PRS69-005D	20050523	Plutonium-238	19.18	19.18		U	55	597459.4	1464006
PRS69-005D	20050523	Radium-226	1.71	0.98			2.9	597459.4	1464006
PRS69-005D	20050523	Thorium-228	0.844	0.0189			2.6	597459.4	1464006
PRS69-005D	20050523	Thorium-230	0.941	0.00678			2.8	597459.4	1464006
PRS69-005D	20050523	Thorium-232	0.741	0.00678			2.1	597459.4	1464006
PRS69-006	20050523	Actinium-227	0.93	0.93		U	4.6	597459.4	1464107
PRS69-006	20050523	Americium-241	0.11	0.11			63	597459.4	1464107
PRS69-006	20050523	Cesium-137	0.9	0.07			3.8	597459.4	1464107
PRS69-006	20050523	Cobalt-60	0.9	0.9		U	0.7	597459.4	1464107
PRS69-006	20050523	Lead-210	2.43	1.05			7.4	597459.4	1464107
PRS69-006	20050523	Plutonium-238	19.96	19.96		U	55	597459.4	1464107
PRS69-006	20050523	Radium-226	1.72	1.11			2.9	597459.4	1464107
PRS69-006	20050523	Thorium-228	0.913	0.0172			2.6	597459.4	1464107
PRS69-006	20050523	Thorium-230	1.04	0.00541			2.8	597459.4	1464107
PRS69-006	20050523	Thorium-232	0.752	0.00541			2.1	597459.4	1464107
PRS69-007	20050523	Actinium-227	0.89	0.89		U	4.6	597459.4	1464207
PRS69-007	20050523	Americium-241	0.16	0.1			63	597459.4	1464207
PRS69-007	20050523	Cesium-137	0.1	0.05			3.8	597459.4	1464207
PRS69-007	20050523	Cobalt-60	0.1	0.1		U	0.7	597459.4	1464207
PRS69-007	20050523	Lead-210	2.04	0.93			7.4	597459.4	1464207
PRS69-007	20050523	Plutonium-238	17.3	17.3		U	55	597459.4	1464207
PRS69-007	20050523	Radium-226	1.07	1.01			2.9	597459.4	1464207
PRS69-007	20050523	Thorium-228	0.909	0.0217			2.6	597459.4	1464207
PRS69-007	20050523	Thorium-230	0.847	0.00683			2.8	597459.4	1464207
PRS69-007	20050523	Thorium-232	0.721	0.00683			2.1	597459.4	1464207
PRS69-008	20050523	Actinium-227	0.37	0.37		U	4.6	597546.5	1464056
PRS69-008	20050523	Americium-241	0.12	0.1			63	597546.5	1464056
PRS69-008	20050523	Cesium-137	0.08	0.08		U	3.8	597546.5	1464056
PRS69-008	20050523	Cobalt-60	0.08	0.08		U	0.7	597546.5	1464056
PRS69-008	20050523	Lead-210	1.85	1.02			7.4	597546.5	1464056
PRS69-008	20050523	Plutonium-238	19.68	19.68		U	55	597546.5	1464056
PRS69-008	20050523	Radium-226	1.89	0.96			2.9	597546.5	1464056
PRS69-008	20050523	Thorium-228	0.811	0.0206			2.6	597546.5	1464056
PRS69-008	20050523	Thorium-230	0.807	0.00698			2.8	597546.5	1464056
PRS69-008	20050523	Thorium-232	0.662	0.00698			2.1	597546.5	1464056
PRS69-009	20050523	Actinium-227	0.27	0.27		U	4.6	597546.5	1464157
PRS69-009	20050523	Americium-241	0.1	0.09			63	597546.5	1464157

Table 1: Verification Results (pCi/g)

[onsite gamma spec and offsite isotopic thorium, all results < CO]
[th-230 and th-232 superseded to that of offsite result for verification/statistical purposes]

Location	Date	Analyte	Result	Detection Limit	Data Qualifier	Lab Qualifier	Cleanup Objective	Northing	Easting
PRS69-009	20050523	Cesium-137	0.06	0.06		U	3.8	597546.5	1464157
PRS69-009	20050523	Cobalt-60	0.08	0.08		U	0.7	597546.5	1464157
PRS69-009	20050523	Lead-210	1.87	0.78			7.4	597546.5	1464157
PRS69-009	20050523	Plutonium-238	15.08	15.08		U	55	597546.5	1464157
PRS69-009	20050523	Radium-226	1.29	0.89			2.9	597546.5	1464157
PRS69-009	20050523	Thorium-228	0.685	0.0201			2.6	597546.5	1464157
PRS69-009	20050523	Thorium-230	0.732	0.00573			2.8	597546.5	1464157
PRS69-009	20050523	Thorium-232	0.603	0.00573			2.1	597546.5	1464157
PRS69-010	20050523	Actinium-227	0.31	0.3			4.6	597546.5	1464258
PRS69-010	20050523	Americium-241	0.1	0.1		U	63	597546.5	1464258
PRS69-010	20050523	Cesium-137	0.06	0.06		U	3.8	597546.5	1464258
PRS69-010	20050523	Cobalt-60	0.09	0.09		U	0.7	597546.5	1464258
PRS69-010	20050523	Lead-210	1.99	0.9			7.4	597546.5	1464258
PRS69-010	20050523	Plutonium-238	17.03	17.03		U	55	597546.5	1464258
PRS69-010	20050523	Radium-226	1.27	1			2.9	597546.5	1464258
PRS69-010	20050523	Thorium-228	0.428	0.0142			2.6	597546.5	1464258
PRS69-010	20050523	Thorium-230	0.57	0.0051			2.8	597546.5	1464258
PRS69-010	20050523	Thorium-232	0.354	0.0051			2.1	597546.5	1464258
PRS69-011	20050523	Actinium-227	0.94	0.94		U	4.6	597429.1	1464053
PRS69-011	20050523	Americium-241	0.11	0.11		U	63	597429.1	1464053
PRS69-011	20050523	Cesium-137	0.08	0.07			3.8	597429.1	1464053
PRS69-011	20050523	Cobalt-60	0.1	0.1		U	0.7	597429.1	1464053
PRS69-011	20050523	Lead-210	2.01	1.03			7.4	597429.1	1464053
PRS69-011	20050523	Plutonium-238	18.62	18.62		U	55	597429.1	1464053
PRS69-011	20050523	Radium-226	1.1	1.03			2.9	597429.1	1464053
PRS69-011	20050523	Thorium-228	0.885	0.0188			2.6	597429.1	1464053
PRS69-011	20050523	Thorium-230	0.862	0.00638			2.8	597429.1	1464053
PRS69-011	20050523	Thorium-232	0.737	0.00638			2.1	597429.1	1464053
PRS69-012	20050523	Actinium-227	1.02	1.02		U	4.6	597435.1	1464125
PRS69-012	20050523	Americium-241	0.12	0.12		U	63	597435.1	1464125
PRS69-012	20050523	Cesium-137	0.16	0.05			3.8	597435.1	1464125
PRS69-012	20050523	Cobalt-60	0.07	0.07		U	0.7	597435.1	1464125
PRS69-012	20050523	Lead-210	1.73	1.02			7.4	597435.1	1464125
PRS69-012	20050523	Plutonium-238	19.97	19.97		U	55	597435.1	1464125
PRS69-012	20050523	Radium-226	2.35	1			2.9	597435.1	1464125
PRS69-012	20050523	Thorium-228	0.927	0.0184			2.6	597435.1	1464125
PRS69-012	20050523	Thorium-230	1.02	0.0162			2.8	597435.1	1464125
PRS69-012	20050523	Thorium-232	0.67	0.0116			2.1	597435.1	1464125
PRS69-013	20050523	Actinium-227	0.26	0.26		U	4.6	597414.7	1464236
PRS69-013	20050523	Americium-241	0.15	0.09			63	597414.7	1464236
PRS69-013	20050523	Cesium-137	0.09	0.05			3.8	597414.7	1464236
PRS69-013	20050523	Cobalt-60	0.07	0.07		U	0.7	597414.7	1464236
PRS69-013	20050523	Lead-210	2.75	0.82			7.4	597414.7	1464236
PRS69-013	20050523	Plutonium-238	19.85	19.85		U	55	597414.7	1464236
PRS69-013	20050523	Radium-226	1.98	0.87			2.9	597414.7	1464236
PRS69-013	20050523	Thorium-228	0.982	0.0231			2.6	597414.7	1464236

Table 1: Verification Results (pCi/g)

[onsite gamma spec and offsite isotopic thorium, all results < CO]
[th-230 and th-232 superseded to that of offsite result for verification/statistical purposes]

Location	Date	Analyte	Result	Detection Limit	Data Qualifier	Lab Qualifier	Cleanup Objective	Northing	Easting
PRS69-013	20050523	Thorium-230	0.966	0.00727			2.8	597414.7	1464236
PRS69-013	20050523	Thorium-232	0.777	0.0161			2.1	597414.7	1464236
PRS69-014	20050523	Actinium-227	0.43	0.28			4.6	597569.3	1464174
PRS69-014	20050523	Americium-241	0.5	0.11			63	597569.3	1464174
PRS69-014	20050523	Cesium-137	0.05	0.05		U	3.8	597569.3	1464174
PRS69-014	20050523	Cobalt-60	0.1	0.1		U	0.7	597569.3	1464174
PRS69-014	20050523	Lead-210	2.33	0.87			7.4	597569.3	1464174
PRS69-014	20050523	Plutonium-238	31.8	20.08			55	597569.3	1464174
PRS69-014	20050523	Radium-226	1.17	0.87			2.9	597569.3	1464174
PRS69-014	20050523	Thorium-228	0.823	0.00686			2.6	597569.3	1464174
PRS69-014	20050523	Thorium-230	0.699	0.0067			2.8	597569.3	1464174
PRS69-014	20050523	Thorium-232	0.582	0.0148			2.1	597569.3	1464174
PRS69-015	20050523	Actinium-227	0.28	0.28		U	4.6	597572.5	1464202
PRS69-015	20050523	Americium-241	0.23	0.09			63	597572.5	1464202
PRS69-015	20050523	Cesium-137	0.06	0.06		U	3.8	597572.5	1464202
PRS69-015	20050523	Cobalt-60	0.08	0.08		U	0.7	597572.5	1464202
PRS69-015	20050523	Lead-210	2.57	0.75			7.4	597572.5	1464202
PRS69-015	20050523	Plutonium-238	27.37	19.89			55	597572.5	1464202
PRS69-015	20050523	Radium-226	1.03	0.85			2.9	597572.5	1464202
PRS69-015	20050523	Thorium-228	0.944	0.0154			2.6	597572.5	1464202
PRS69-015	20050523	Thorium-230	0.692	0.0122			2.8	597572.5	1464202
PRS69-015	20050523	Thorium-232	0.814	0.0122			2.1	597572.5	1464202
PRS69-016	20050523	Actinium-227	0.3	0.3		U	4.6	597568	1464159
PRS69-016	20050523	Americium-241	0.17	0.09			63	597568	1464159
PRS69-016	20050523	Cesium-137	0.06	0.06			3.8	597568	1464159
PRS69-016	20050523	Cobalt-60	0.1	0.1		U	0.7	597568	1464159
PRS69-016	20050523	Lead-210	1.52	0.9			7.4	597568	1464159
PRS69-016	20050523	Plutonium-238	20.65	20.65		U	55	597568	1464159
PRS69-016	20050523	Radium-226	2.32	0.89			2.9	597568	1464159
PRS69-016	20050523	Thorium-228	1.05	0.0223			2.6	597568	1464159
PRS69-016	20050523	Thorium-230	0.79	0.00702			2.8	597568	1464159
PRS69-016	20050523	Thorium-232	0.647	0.00702			2.1	597568	1464159
PRS69-017	20050523	Actinium-227	0.22	0.22		U	4.6	597566.8	1464145
PRS69-017	20050523	Americium-241	0.08	0.08		U	63	597566.8	1464145
PRS69-017	20050523	Cesium-137	0.05	0.05			3.8	597566.8	1464145
PRS69-017	20050523	Cobalt-60	0.05	0.05		U	0.7	597566.8	1464145
PRS69-017	20050523	Lead-210	1.69	0.66			7.4	597566.8	1464145
PRS69-017	20050523	Plutonium-238	14.88	14.88		U	55	597566.8	1464145
PRS69-017	20050523	Radium-226	1.71	0.73			2.9	597566.8	1464145
PRS69-017	20050523	Thorium-228	0.679	0.0217			2.6	597566.8	1464145
PRS69-017	20050523	Thorium-230	0.684	0.00684			2.8	597566.8	1464145
PRS69-017	20050523	Thorium-232	0.551	0.0151			2.1	597566.8	1464145
PRS69-018	20050523	Actinium-227	0.28	0.28		U	4.6	597303.1	1464230
PRS69-018	20050523	Americium-241	0.07	0.07			63	597303.1	1464230
PRS69-018	20050523	Cesium-137	0.05	0.05			3.8	597303.1	1464230
PRS69-018	20050523	Cobalt-60	0.06	0.06		U	0.7	597303.1	1464230

Table 1: Verification Results (pCi/g)

[onsite gamma spec and offsite isotopic thorium, all results < CO]
[th-230 and th-232 superseded to that of offsite result for verification/statistical purposes]

Location	Date	Analyte	Result	Detection Limit	Data Qualifier	Lab Qualifier	Cleanup Objective	Northing	Easting
PRS69-018	20050523	Lead-210	1.96	0.71			7.4	597303.1	1464230
PRS69-018	20050523	Plutonium-238	16.22	16.22		U	55	597303.1	1464230
PRS69-018	20050523	Radium-226	1.12	0.8			2.9	597303.1	1464230
PRS69-018	20050523	Thorium-228	0.955	0.021			2.6	597303.1	1464230
PRS69-018	20050523	Thorium-230	0.73	0.0146			2.8	597303.1	1464230
PRS69-018	20050523	Thorium-232	0.751	0.0146			2.1	597303.1	1464230
PRS69-018D	20050523	Actinium-227	0.28	0.28		U	4.6	597303.1	1464230
PRS69-018D	20050523	Americium-241	0.07	0.07		U	63	597303.1	1464230
PRS69-018D	20050523	Cesium-137	0.06	0.05			3.8	597303.1	1464230
PRS69-018D	20050523	Cobalt-60	0.08	0.08		U	0.7	597303.1	1464230
PRS69-018D	20050523	Lead-210	1.72	0.74			7.4	597303.1	1464230
PRS69-018D	20050523	Plutonium-238	14.49	14.49		U	55	597303.1	1464230
PRS69-018D	20050523	Radium-226	1.81	0.74			2.9	597303.1	1464230
PRS69-018D	20050523	Thorium-228	0.856	0.0143			2.6	597303.1	1464230
PRS69-018D	20050523	Thorium-230	0.695	0.00512			2.8	597303.1	1464230
PRS69-018D	20050523	Thorium-232	0.703	0.00512			2.1	597303.1	1464230
PRS69-019	20050523	Actinium-227	0.26	0.26		U	4.6	597326.7	1464250
PRS69-019	20050523	Americium-241	0.08	0.07			63	597326.7	1464250
PRS69-019	20050523	Cesium-137	0.08	0.04			3.8	597326.7	1464250
PRS69-019	20050523	Cobalt-60	0.07	0.07		U	0.7	597326.7	1464250
PRS69-019	20050523	Lead-210	1.71	0.73			7.4	597326.7	1464250
PRS69-019	20050523	Plutonium-238	14.84	14.84		U	55	597326.7	1464250
PRS69-019	20050523	Radium-226	1.36	0.82			2.9	597326.7	1464250
PRS69-019	20050523	Thorium-228	0.824	0.00709			2.6	597326.7	1464250
PRS69-019	20050523	Thorium-230	0.766	0.00692			2.8	597326.7	1464250
PRS69-019	20050523	Thorium-232	0.629	0.0153			2.1	597326.7	1464250
PRS69-020	20050523	Actinium-227	0.29	0.29		U	4.6	597295.4	1464258
PRS69-020	20050523	Americium-241	0.09	0.09		U	63	597295.4	1464258
PRS69-020	20050523	Cesium-137	0.06	0.06		U	3.8	597295.4	1464258
PRS69-020	20050523	Cobalt-60	0.08	0.08		U	0.7	597295.4	1464258
PRS69-020	20050523	Lead-210	0.82	0.82		U	7.4	597295.4	1464258
PRS69-020	20050523	Plutonium-238	18.3	18.3		U	55	597295.4	1464258
PRS69-020	20050523	Radium-226	1.79	0.86			2.9	597295.4	1464258
PRS69-020	20050523	Thorium-228	1.12	0.0287			2.6	597295.4	1464258
PRS69-020	20050523	Thorium-230	0.668	0.014			2.8	597295.4	1464258
PRS69-020	20050523	Thorium-232	0.891	0.00791			2.1	597295.4	1464258

U: not detected
D: duplicate

APPENDIX C

EXCERPT FROM POST-EX SUD

A15/40

Survey Unit Design (SUD)

Project: PRS 69

Review & Approval

Project Engineer: Karen Arthur _____

Reviewer: James Fontaine Cline for J. Fontaine

Reviewer: _____

Document	Title
Fact Sheet	PRSs 67, 68, 69, & 70: Site Stormwater Drainage System; March 2004
RP	Site Stormwater Drainage System Removal Plan, Final, August 2004
WP	PRS 69 and 70 Sediment Removal, Cleaning, and Sampling, Draft, December 2004, ER/ST-04-017
VSAP	Standard Verification Sampling & Analysis Plan, Final, August 2004

☐ **Pre- Excavation** or ☒ **Post-Excavation**?

Summary of Changes (for Post-Excavation SUDs ONLY) (See following pages for details)	YES	NO
1. Did the COC(s) change?		X
2. Did the grid size or N change?		X
3. Did the classification change?		X
4. Were bias/judgmental samples collected?		X
5. Other significant change?		X

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SUD Worksheet

Acronyms

AM	Action Memorandum
CO	Cleanup Objective
COC	Contaminant of Concern
Chem	Chemical
DCGL	Derived Concentration Guideline Limit
dev	deviation
Iso	Isotopic
EPA	Environmental Protection Agency
FSS	Final Status Survey
HS	Hot Spot
LBGR	Lower Bound of the Gray Region
MARSSIM	Multi – Agency Radiation Survey and Site Investigation Manual
MD	Mound Document
MDC	Minimum Detectable Concentration
MEIMS	Mound Environmental Information Management System
NA or N/A	Non-applicable
NC	No Change
pCi/g	pico-Curie(s) per gram
PRS	Potential Release Site
Pu	Plutonium
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action/Removal Action
RadCon	Radiological Control
RASS	Remedial Action Support Survey
RP	Removal Plan
SPF	Survey Plan Form
RSDS	Radiological Survey Data Sheet
(s) or s	effective standard deviation (MARSSIM)
std	standard
SU	Survey Unit
SUD	Survey Unit Design
TBD	To Be Determined
Th	Thorium
U	Uranium
VSAP	Verification Sampling and Analysis Plan
VSP	Visual Sample Plan
WP	Work Package/Work Plan
VSP	Visual Sample Plan
WP	Work Package/Work Plan

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SUD Worksheet

Item 1

Summary of historic **information** relevant to SU:

PRS 69 is the overflow pond located at the southwest end of the Plant's drainage ditches. It is used to retain storm water flows, settle sediment, and support compliance with the National Pollutant Discharge Elimination System (NPDES) discharge standards for suspended solids. The pond is fed by two inlets, one being the PRS 67 drainage ditch and the other being a drainage structure (PRS 418) which was binned No Further Assessment. PRS 69 addresses only the stormwater sediment within the pond

In general, systematic isolation of various segments of the Storm Drainage System (starting at the Asphalt pond), draining the isolated segments, sampling, removal of contaminated sediments or soil areas will be accomplished. Once the prerequisite planning and required preparations are complete, the actual removal will be performed with periodic verification and backfilling as the removal proceeds. Generally speaking, each phase will be completed or at least in transition prior to starting the next, although the project retains the authority to alter the sequencing if the situation warrants.

The plan is to place all facets of the Storm Drainage System back into service upon completion of all verification sampling. Most of the planned remediation projects, which supply storm water to this system, will be nearing completion and present a low possibility for recontamination. Those areas, which are not complete, will require monitoring of potential contamination sources and the appropriate storm water pollution prevention plans must be implemented to guard against cross-contamination. The Removal Plan identifies those prerequisite tasks to be done by others and provides instructions for work presented in Attachment A , B, and C of the Plan. Any risks or safety concerns are also noted; however, detailed task-by-task work instructions for work and health and safety is more fully addressed in the Work Package (Detailed Work Instructions) and its associated JSHA.

Item 2

Summary of historic **data** relevant to SU:

The listed COC for PRS 69 is Th-232. This is due to a single location; station "SCR32," having Th-232 at 2.70 pCi/g or some 129% of the cleanup objective though below the hot spot criteria of 3.5 pCi/g. It is the only location showing an exceedance of the CO and this sample result is highly suspect, as it was a screening-level sample with a stated detection limit of 0 pCi/g. Historic and RASS sampling (further characterization performed August 2004) are depicted and listed in Attachment A.

Changes if any, from Pre-Ex SUD: Subsequent RASS and sediment sampling results (including the re-sampling of location SCR32) show <CO for all analytes. See results in Appendix II.

Item 3a

COC	BASIS	(pCi/g) CO	HS	MAX	Offsite Analysis & Compendium Method: gamma (A-015)	Iso Pu (A-012)	Iso Th (A-012)	Iso U (A-012)
Th-232	Public Fact Sheet for PRSs 67, 68, 69, & 70: Site Stormwater Drainage System	2.1	3.5	2.7			X	

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Analyses are to be performed per Mound Methods Compendium and COs (for surface samples/analysis i.e., bedrock, asphalt, concrete) as applicable. Compendium Method A-012 is Isotopic Uranium, Isotopic Plutonium, and Isotopic Thorium by Alpha Spectrometry and Compendium Method A-015 is Gamma Spectrometry. Surface samples/analysis are to be in accordance with MD-80036 OP 30005, 30007, and 30040. Hard surfaces will be swiped and gross alpha and beta measurements will be performed and compared to the most restrictive COC in Mound 2000 Work Plan Appendix A Table 1 (NUREG 1.86 Regulatory Guide). If the location fails to meet the most restrictive criteria then it will be sent to alpha spec for determination of the COC so the applicable, instead of the most restrictive, criteria can be applied.

Changes if any, from Pre-Ex SUD: Results are provided in Appendix II. No additional sampling required.

Item 3b

Chem basis for std dev, AM COCs/New COCs NA

Item 4

Classify Areas & provide justification

The Area is Class 2 due to the historical sampling result above the CO and because it has a potential for radioactive contamination of known contamination, but is not expected to exceed the $DCGL_W$.

PRS 69 will be partially drained so that portions of the sidewalls that were previously submerged can be scanned.

Note: If the SU should be upgraded to a Class 1 due to sample results or scanning results, the properties of the SU makes it physically impossible to achieve 100% scan coverage. Therefore, a best effort will be given utilizing the standard VSAP, Final, August 2004, Section 4.4 Special Considerations.

Selection	Class	Scan Coverage guidelines
	1	100%
X	2	10-90%
	3	Judgmental

Changes if any, from Pre-Ex SUD: Results of FIDLER walkover scan are provided in Appendix II.

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Item 5	Subdivide areas into SUs See Attachment A for Data See Attachment B for SU	A single survey unit (SU1) of approximately 87,606 sq. ft.
Item 6a	Calculations / Rad 1. Calculate the (S), for each COC listed above: See Attachment B. 2. Number of Samples (N): See Attachment B. Spreadsheet Calculated = 9 samples SU1 Scanning MDC (Area Factor) corrected = 9 samples, Scanning MDC for Th-232 is not an issue. Visual Sample Plan (VSP): SU1 Calculated = 10 Selected Samples (on Map) = 20 The determination of the number of samples is consistent with the standard VSAP. Sample locations were selected by VSP with a random starting point. Three additional samples were chosen via judgmental sampling. Sample locations will be surveyed at the time of sampling or closely following. A total of 20 sample locations will be assessed.	
	Changes if any, from Pre-Ex. SUD: None	
Item 6b	Calculations/ Chemical, Std dev, Number of Samples	NA
	Changes if any, from Pre-Ex. SUD: None	
Item 7	Grid spacing	Calculated and placed with VSP utilizing Attachment B information.
	Changes if any, from Pre-Ex. SUD: None	

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Item 8	QA/QC: 1/20 via field duplicate in accordance with the Standard VSAP Q-002 Chain-of-Custody Procedures Q-003 Documentation Requirements Q-004 Laboratory Data Reduction Q-006 Validation of Laboratory Data Packages Q-007 Data Assessment Q-008 Data Integrity Verification Q-010 Electronic Data Deliverable Format Specifications – MEIMS Std. ... S-001 General Instructions for Field Personnel S-002 Soil Sampling With a Spade and Scoop S-028 Sample Control and Documentation S-029 Guide to Handling, Packaging, and Shipping of Samples and Method Q-002	
Item 9	Bias/judgement samples (Additional bias samples are always within the discretion of the EPA.)	Three bias samples are planned by CH2M Hill at this time, one of which is at the historic sample location of SCR32. The other two bias points were chosen due to observed physical "voids".
	Changes if any, from Pre-Ex. SUD:	See Appendix II for sample results. No bias samples were collected. However, OEPA requested that CH2M Hill take 10 verification points. See Appendix II Fig. 3 for these sample locations.

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Item 10	Not otherwise covered.../ comments Site policy requires performance of onsite soil screening (NaI or germanium) on verification samples slated for offsite analysis and evaluation of the results prior to shipment. This analysis will generally be performed on a split of the verification sample containerized in an EPA dish (approximately 500 mL) but may be performed on the actual verification sample as long as containerization requirements are maintained for the offsite lab. Count time of the analysis will be sufficient to meet the cleanup objectives (COs) of the contaminants of concern (COCs) requiring verification. On site gamma spec typically provides results for: Co-60, Cs-137, Pb-210, Ra-226, Ac-227 (D), Th-230, Th-232 (D), Pu-238, and Am-241. In addition, any isotopes identified to be greater than their MDA (e.g., U-238, Bi-210m, etc.) will be reported on the analytical results sheet. Any exceedances of the CO associated with any isotope will constitute disposal as contaminated waste and evaluation for inclusion as a COC. The sampling of the sediment shall follow U.S. EPA SOP number 2016 Revision number 0.0 (11/17/94) utilizing an AMS Soft Sediment Core Sampler (or equivalent) to sample the full depth of sediment deposition to the clay liner and composited for analysis. If there is an insufficient volume of material to fill an EPA dish within a 1m x 1m square centered on the proposed sample location, due to bedrock or obstruction (such as a structure, foundation, concrete, pavement/asphalt, large rock formations, utility bank, etc. which is not to be removed), then sediment/soil analysis will not be performed. In lieu of a sediment/soil analysis result, Rad Con will survey the surface per COs and provide documentation thereof in an RSDS. Potentially impacted work areas atop the excavation, where excavated sediment/material was loaded into haulers, and are not hard surfaces (e.g., concrete and asphalt) are shown as an additional SU. Potentially impacted work area atop the excavation, where excavated materials were loaded into haulers, and are hard surfaces (e.g., concrete and asphalt) will be surveyed and released per Rad Con procedures. The RSDS(s) will be included as documentation. Any final sample location that does not meet the surface release criteria will be submitted to the Core Team for concurrence or determination of further action. In-process sampling events (Characterization and Remedial Action Support Survey (RASS) samples) were conducted during the entire PRS remediation. Those samples underwent gamma spectrometry analysis to guide actions. RASS sampling of the remediated areas were used to determine if the FSS (verification) sampling could be conducted. The plan is to place all facets of the Storm Drainage System back into service upon completion of verification sampling. Most of the plant remediation projects, which supply storm water to this system, will be nearing completion and present a low possibility for recontamination. Those areas, which are not complete, will require monitoring of potential contamination sources and the appropriate storm water pollution prevention measures/plans must be put in place to guard against cross-contamination.
10a	Changes if any, from Pre-Ex. SUD: No remediation occurred, therefore no RASS samples were collected.

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APPENDIX D

RSDSs

A23/40

RADIOLOGICAL SURVEY DATA SHEET

LOCATION: (BLDG. / ROOM / AREA) POND	SURVEY NO. 05-ER-0475
PURPOSE: FIDLER WALK OVER	RWP NO: N/A
	DATE: 7-26-05
	TIME: 1000

MAP / DRAWING

SEE ATTACHED MAP

COPY

LEGEND:
= mrem/hr (γ) whole body
#E = mrem/hr (β+n+γ) extremity on contact
K = factor of 1000
— · — · — = radiological boundary
△# = mrem/hr neutron
(#) = swipe number
#/α = air sample number
or /β = direct contamination measurement in dpm/100 cm²

INSTRUMENTS USED

Instrument	Serial Number	Cal Due Date
FIDLER	4122/4125	1/12/06
FIDLER	4113/3996	1/26/06
	N/A	

[redacted]

	HPT	Date
[redacted]	[redacted]	7-26-05
Counted by: (Print Name) N/A	HPT	Date
Counted by: (Print Name) [redacted]		
Reviewed/Approved by [redacted]	HPT [redacted]	Date 7-26-05
Reviewed/Approved by: (Print Name) [redacted]		

MI-RI20 (7-94) Computer Generated

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Survey No. 05-ER-0475

RADIOLOGICAL SURVEY DATA SHEET (cont.)

Removable Contamination				
Swipes (dpm/100cm²)				
Sample #	β/γ	Alpha		Comments
N/A				

Removable Contamination				
Swipes (dpm/100cm²)				
Sample #	β/γ	Alpha		Comments
N/A				

COPY

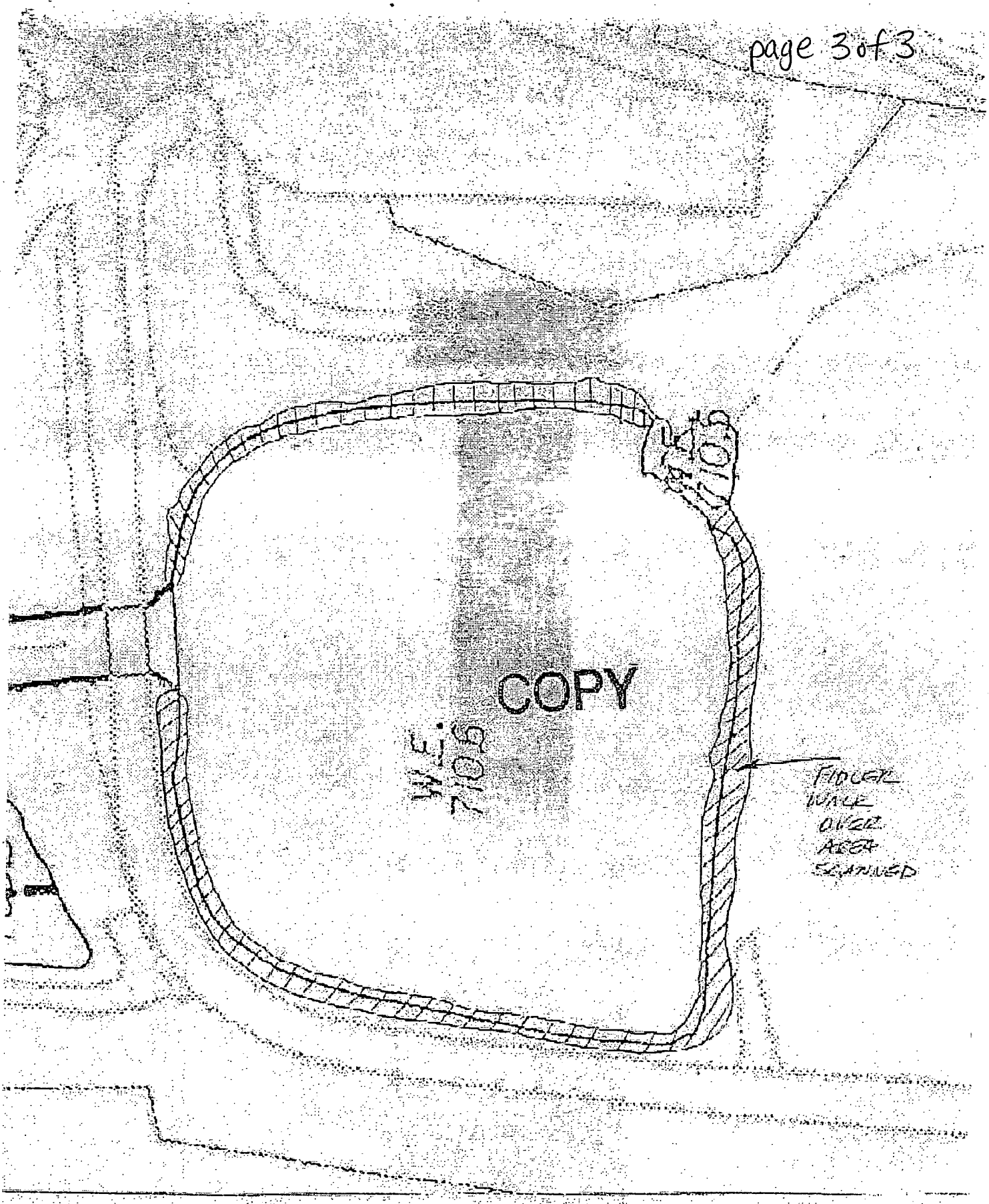
COMMENTS: FIDLER USED AS AN INDICATOR ONLY - FIDLER OUT CHANNEL B/GD 10K CPM - ALL READINGS WERE AT BKGD, NO ELEVATED READINGS

NOTES:

1. See MD-80036 10002 for calculations of WB, extremity and skin dose rates.
2. To request RO Count Room analysis for β/γ, alpha or tritium, leave column blank. Mark column N/A if not needed. If count room printout of results are attached, write "see attached" in column.
3. Annotate special sample type (e.g., soil, water), special identifiers or otherwise in Comments. If needed, mark N/A.

ML-9620A (4-00)

A25/40


COPY
FIDUCIAL MARK OVER AREA SCANNED

APPENDIX E

STATISTICAL INFORMATION

Spreadsheet (includes recalculation of N):

Retro Curve

TABLE II-1

PRS 69 Historical, Verification, & Sediment Sampling Data

(pCi/g)

Sample ID	Type	Thorium-232	MDA	Start Depth	End Depth
	CO=	2.1			
PRS69-001	Verification	0.541	0.00673	0	2
PRS69-002	Verification	0.759	0.00804	0	2
PRS69-003	Verification	0.805	0.0151	0	2
PRS69-004	Verification	0.615	0.0115	0	2
PRS69-005	Verification	1.546	0.0113	0	2
PRS69-006	Verification	0.752	0.00541	0	2
PRS69-007	Verification	0.721	0.00683	0	2
PRS69-008	Verification	0.662	0.00698	0	2
PRS69-009	Verification	0.603	0.00573	0	2
PRS69-010	Verification	0.354	0.0051	0	2
PRS69-011	Verification	0.737	0.00638	0	2
PRS69-012	Verification	0.67	0.0116	0	2
PRS69-013	Verification	0.777	0.0161	0	2
PRS69-014	Verification	0.582	0.0148	0	2
PRS69-015	Verification	0.814	0.0122	0	2
PRS69-016	Verification	0.647	0.00702	0	2
PRS69-017	Verification	0.551	0.0151	0	2
PRS69-018	Verification	1.454	0.0146	0	2
PRS69-019	Verification	0.629	0.0153	0	2
PRS69-020	Verification	0.891	0.00791	0	2
PRS 69 1-1	Sediment	1.11	0.33	0	1
PRS 69 1-2	Sediment	1.31	0.33	1	2
PRS 69 2-1	Sediment	1.56	0.32	0	1
PRS 69 2-2	Sediment	0.96	0.27	1	2
PRS 69 3-1	Sediment	1.42	0.4	0	1
PRS 69 3-2	Sediment	1.18	0.22	1	2
2301	Historical	0.731	0.00744	0	0
2301	Historical	0.587	0.0218	0	0
2302	Historical	0.987	0.00562	0	0
2302	Historical	0.676	0.0231	0	0
2303	Historical	0.995	0.00889	0	0
2303	Historical	0.656	0.0129	0	0
2304	Historical	0.936	0.00989	0	0
2304	Historical	0.787	0.0318	0	0
2304	Historical	0.603	0.0204	0	0
2305	Historical	1.05	0.0116	0	0
2305	Historical	0.67	0.05	0	0
2305	Historical	0.592	0.0323	0	0
MO40101	Historical	0.83	n/a	0	0.9
MO40102	Historical	0.071	n/a	0	1.2
MO40103	Historical	0.53	n/a	0	0.8
S0559	Historical	2	2	0	0
S0560	Historical	2	2	0	0
S0812	Historical	2	2	0	0
S0816	Historical	2	2	0	0
S0858	Historical	2	2	0	0
S0859	Historical	2	2	0	0
S0860	Historical	2	2	0	0
S0861	Historical	2	2	0	0
S0865	Historical	2	2	0	0
SCR24	Historical	0.3	n/a	0	0
SCR43	Historical	1.5	n/a	0	0
SCR43	Historical	1.2	n/a	0	0
SCR43	Historical	1.2	n/a	0	0
SCR43	Historical	1	n/a	0	0
SCR43	Historical	0.9	n/a	0	0
SCR43	Historical	0.9	n/a	0	0
SCR50	Historical	0.6	n/a	0	0
SCR50	Historical	0.6	n/a	0	0
SCR50	Historical	0.6	n/a	0	0
SCR50	Historical	0.5	n/a	0	0
SCR50	Historical	0.5	n/a	0	0
SCR50	Historical	0.4	n/a	0	0
SCR50	Historical	0.4	n/a	0	0
SCR50	Historical	0.4	n/a	0	0
Std. Dev.		0.5331			

TABLE II-2

Excluded Data

(pCi/g)

Sample ID *	Type	Thorium-232	MDA	Start Depth	End Depth
	CO=	2.1			
SCR32	Historical	2.7	n/a	0	0
SCR32	Historical	2.6	n/a	0	0
SCR32	Historical	2.5	n/a	0	0
SCR32	Historical	2.4	n/a	0	0
SCR32	Historical	2.4	n/a	0	0
SCR32	Historical	2.3	n/a	0	0
SCR32	Historical	2.3	n/a	0	0
SCR32	Historical	2.3	n/a	0	0
SCR32	Historical	2.1	n/a	0	0
SCR32	Historical	2.1	n/a	0	0
SCR32	Historical	2	n/a	0	0
SCR32	Historical	1.9	n/a	0	0
SCR32	Historical	1.8	n/a	0	0
SCR32	Historical	1.8	n/a	0	0
SCR32	Historical	1.7	n/a	0	0
SCR32	Historical	1.6	n/a	0	0
SCR32	Historical	1.6	n/a	0	0
SCR32	Historical	1.6	n/a	0	0
SCR32	Historical	1.5	n/a	0	0
SCR32	Historical	1.5	n/a	0	0
SCR32	Historical	1.5	n/a	0	0
SCR32	Historical	1.4	n/a	0	0
SCR32	Historical	1.4	n/a	0	0
SCR32	Historical	1.2	n/a	0	0
SCR32	Historical	1	n/a	0	0

* This location will be retired in MEIMS and data will be replaced with more recent and accurate data results from Table II-1

Verification Samples were collected with a Peat sampler. The Peat sampler was pushed to refusal which was assumed to be the liner. The sampler collected 2 ft. of sediment from the refusal surface and was composited for analysis.

PRS 69 Class 2
Post-Excavation SUD

Sample Standard Deviation (*s*)	Radionuclide	Cleanup Objective	Units
	Ac-227+D	4.6	(pCi/g)
	Am-241	63	(pCi/g)
	Ce-141	38	(pCi/g)
	Cs-137+D	3.8	(pCi/g)
	Co-60	0.7	(pCi/g)
	Cu-244	92	(pCi/g)
	Pb-210+D	7.4	(pCi/g)
	Np-237+D	10.4	(pCi/g)
	Ni-95	2.5	(pCi/g)
	Pu-238	55	(pCi/g)
	Pu-239/240	62	(pCi/g)
	Pa-231+D	4	(pCi/g)
	Ra-226+D	2.9	(pCi/g)
	Ra-228	2.1	(pCi/g)
	Th-228+D	2.6	(pCi/g)
	Th-230+D	2.8	(pCi/g)
0.5331	Th-232+D	2.1	(pCi/g)
	U-233+D	4.8	(pCi/g)
	U-234	106.1	(pCi/g)
	U-234+D	2	(pCi/g)
	U-235	16.11	(pCi/g)
	U-235+D	3.2	(pCi/g)
	U-238	121.2	(pCi/g)
	U-238+D	2.2	(pCi/g)
	Bi-207	1.2	(pCi/g)
	Bi-210m	8.3	(pCi/g)
	Tc-99	2140	(pCi/g)
	Sr-90	94.72	(pCi/g)

Type I Error	0.05	
$Z_{1\text{-alpha}}$	1.645	
Type II Error	0.2	
$Z_{1\text{-beta}}$	0.842	
Effective	0.53	*(s)*
Sign p	0.971284	

Calculate the Total Effective (s)

Estimate (N) - Sign Test

DCGL	2.1
LBGR	1.05
Delta	1.05
(s)	0.53
Rel Shift	1.970
(N)	9.00

Sample Grid Spacing

SU Area	8,224.93	m^2
Grid Length	28.1	m
Grid Height	24.4	m

Sample Grid Spacing

SU Area	88440.16	ft^2
Grid Length	92.3	ft
Grid Height	79.9	ft

PRS	69

Survey Unit	1

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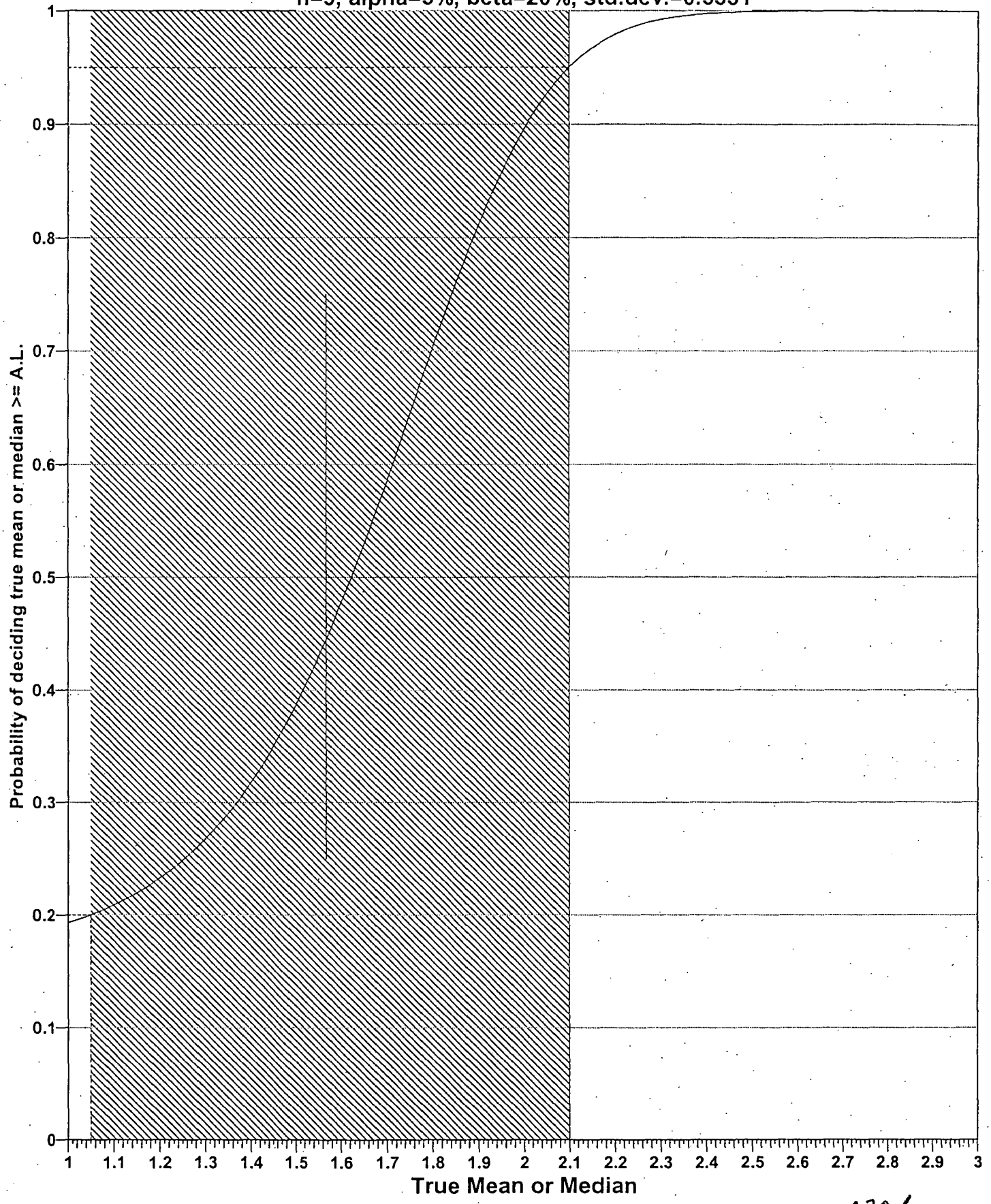
MARSSIM Sign Test

n=9, alpha=5%, beta=20%, std.dev.=0.5331



APPENDIX F

DATA REVIEW & VALIDATION

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Acronyms and Abbreviations

DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
MDA	minimum detectable activity
MEIMS	Mound Environmental Information Management System
PRS	potential release site
RPD	relative percent difference
SOW	Statement of Work
USEPA	United States Environmental Protection Agency
VSAP	Verification Sampling and Analysis Plan

1.0 Introduction

1.1 Introduction

This data assessment report has been prepared to describe the data quality for Potential Release Site (PRS) 69 Verification data. Data assessment encompasses two types of quality control reviews on the data: data review and data validation. Data review involves a review of the basic quality control data included in the laboratory data package, e.g., laboratory blanks, surrogate recoveries, matrix spike recoveries, and field duplicates. Data validation is a detailed review of the laboratory data packages that includes all of the data review elements plus verification of such things as proper instrument calibration, instrument calibration validity during sample analysis, identification of target analytes, and proper treatment and quantification of the data. Data validation was performed on 10% of the samples. The results of the data validation are assessed to identify whether any systemic problems are apparent.

2.0 Field Work Quality Assurance

2.1 Work Plan Compliance

Work was generally performed in compliance with the Statement of Work (SOW) issued 3 May 2005 and the Mound Method Compendium. The following exceptions to the work plan compliance occurred during the field sampling events.

Table 1 — List of Variances

Variance	Description
1	**Field Sampling — May 2005** Weston performed sampling on the first day with a standard sediment sampler as agreed upon by CH2M Hill. The sampler failed to hold the sample. Weston requested a change order to acquire and use a Russian Peat Sampler instead of the standard sediment sampler. The alternate sampling tool worked, but resulted in an extra field day of effort.
2	**Laboratory Reporting — June 2005** The laboratory used the full sample identification rather than the last six digits. The use of the long sample identifications for samples 000007 and 000019 caused the identifications to be truncated on the actual results page. The error also increased the difficulty of loading the MEIMS shell. The error was due to a new laboratory project manager being assigned by Severn Trent Laboratories.

2.2 *Field Quality Control Frequency – Verification Sampling*

The field sampling team is responsible for introducing or specifying field quality control samples, e.g. field rinsates, field duplicates, matrix spike/matrix spike duplicates, and trip blanks. There was one field sampling events during the PRS 69 field verification project. The field quality control frequencies required for PRS 69 are as follows:

- Field rinsates will be collected at a frequency of 1 per 20 samples
- Field duplicates will be collected at a frequency of 1 per 10 samples
- Matrix spike/matrix spike duplicates will be collected at a frequency of 1 per 20 samples

The compliance with field quality control frequencies are assessed in the following subsections.

2.2.1 Sampling Event

The field quality assurance frequencies were met or exceeded for the project.

Table 2 — Sampling Event Quality Control Sample Frequency

Analysis	Number of Samples	Field Rinsates	Field Duplicates	Matrix Spikes	Trip Blanks
Isotopic Thorium	20	1	2	1	NA

3.0 Data Review and Data Validation

3.1 Data Review

Weston Solutions, Inc. performed the data review and compiled this Data Review and Validation Report. The quality control data submitted with the analytical data packages were reviewed and assessed. The results of the assessment are presented in this section. The following qualifications were used to indicate data quality problems

identified during the data review process. The qualifications are essentially the same as those used for data validation.

Table 3 — Data Review Qualifications

Qualification	Description
J	The associated positive sample result is estimated.
J/UJ	The associated positive and not-detected sample results are qualified estimated.
R	The associated sample result is rejected and unusable.
U	The associated sample result is qualified not detected.
UJ	The associated not-detected sample result is qualified estimated.

3.1.1 Radiological Analysis

The field team submitted samples for isotopic thorium analysis. The following table shows the number of samples submitted for analysis.

Table 4 — Radiological Sample Quantities

Analysis	Number of Samples
Isotopic Thorium	20

Data review elements including yields, matrix spikes, laboratory blanks, laboratory duplicates, field rinsates, and field duplicates and are evaluated in the following subsections.

3.1.1.1 Yields

Yields were determined for isotopic thorium analyses by alpha spectrometry and are used to assess and adjust for analytical inefficiencies that occur during sample preparation and analysis. The thorium yields ranged from 68.6% in sample 000006 to 88.7% in sample 000016. These recoveries were all within the acceptance range of 20 – 120%.

3.1.1.2 Matrix Spikes

Matrix spikes are prepared to verify the sample matrix is not interfering with the accurate and precise determination of target parameters. Only one sample, 000008, was submitted for isotopic thorium matrix spike analysis. The recoveries for thorium-230

were 100.5 and 101.4%. These recoveries were within the 80 – 120% acceptance limit.

3.1.1.3 Laboratory Blanks

Laboratory blanks are used to verify that laboratory handling and procedures are not contaminating samples with target parameters. The laboratory introduced two laboratory blanks, HC1531AB and HC15P1AB, for isotopic thorium analysis. No positive results were reported for in these blanks. The associated data are usable without qualification.

3.1.1.4 Laboratory Duplicates

Laboratory duplicates are used to access the sample analysis precision. The following table lists the analysis, the number of samples submitted and the number of laboratory duplicate analyses.

Table 5 — Laboratory Duplicate Quantities

Analysis	Number of Samples	Number of Lab Duplicates
Isotopic Thorium	20	2

The laboratory duplicate samples were evaluated by calculating the RPD. Relative percent differences were not calculated for duplicate pairs where both results were not detected or less than 2x the minimum detectable activity (MDA). If one result was greater than 2x the MDA and the other result was not detected, a 200% relative percent difference was used. If one result was greater than 2x the MDA and the other result was detected at less than 2x the MDA, the RPD was calculated. After calculating the RPDs, an average of RPDs for each analyte was calculated. The following table lists the results where a valid RPD could be calculated. The laboratory analyzed samples 000001 and 000012 in duplicate. The results are shown in Table 6.

Table 6 — Laboratory Duplicate RPDs for Radioisotopes

Analyte	All Detections	
	Frequency of Detection	Average RPD (%)
Thorium-228	2	7
Thorium-230	2	6
Thorium-232	2	7

Based on these results, the overall precision was good.

3.1.1.5 Field Rinsates

Field rinsates are introduced to determine whether field decontamination procedures and field handling procedures could be contaminating sample results with target parameters. The field team submitted one rinsate for isotopic thorium analysis. No target parameters were detected in the rinsate.

3.1.1.6 Field Duplicates

Field duplicates are used to access the sample collection and sample analysis precision. The following table lists the analysis, the number of samples submitted and the number of field duplicates submitted.

Table 7 — Field Duplicate Quantities

Analysis	Number of Samples	Number of Field Duplicates
Isotopic Thorium	20	2

The field duplicate samples were evaluated by calculating the relative percent differences. Relative percent differences were not calculated for duplicate pairs where both results were not detected or less than 2x the MDA. If one result was greater than 2x the MDA and the other result was not detected, a 200% relative percent difference was used. If one result was greater than 2x the MDA and the other result was detected at less than 2x the MDA, the RPD was calculated. After calculating the relative percent differences, an average of relative percent differences for each analyte was calculated.

Samples 000006/000007 and 000018/000019 were submitted as field duplicates. The results are shown in table 8.

Table 8 — Field Duplicate RPDs for Radioisotopes

Analyte	All Detections	
	Frequency of Detection	Average RPD (%)
Thorium-228	2	10
Thorium-230	2	17
Thorium-232	2	7

Based on these results, the overall precision was good. The precision for thorium-230 in field duplicate pair 000018/000019 was somewhat higher than expected at 28%, but still within the acceptance range of less than 50% for soils.

3.2 Data Validation

Data validation was subcontracted to TechLaw, Inc. The field team submitted 20 samples isotopic thorium analysis and two of the samples were validated, 000008 and 000018. No deficiencies were identified during data validation and the data remain unqualified. Validated data are presented in Table 1 of the Data Report.

4.0 References

DOE (U.S. Department of Energy). 22 January 2002. *Methods Compendium.* Mound Plant, Miamisburg OH. Technical Manual MD-80045, Issue 2.

EPA (U.S. Environmental Protection Agency). July 1999. *Data Validation Standard Operating Procedures for Contract Laboratory Program Routine Analytical Services.* Region IV, Science and Ecosystem Support Division, Office of Quality Assurance, Athens GA. Revision 2.1.

ATTACHMENT B

GENERAL MEDIA INFORMATION

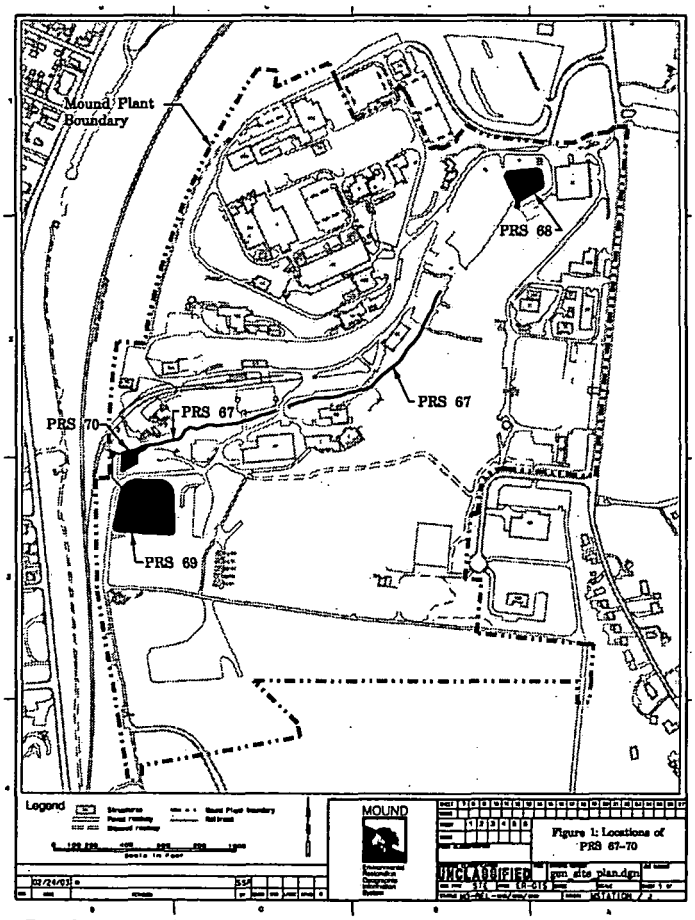
PUBLIC FACT SHEET

PRSs 67, 68, 69, & 70: Site Stormwater Drainage System

This Fact Sheet satisfies the Public Notification requirement set forth in the Contingent Action Memorandum[1].

Background. Potential Release Sites (PRSs) 67 through 70 are the primary components of the site stormwater drainage system as identified in the following table:

PRS	Description
67	Plant Drainage Ditch
68	Asphalt Lined Pond - North
69	Plant Overflow Pond - South
70	Retention Basins and Weir Basin



PRS 67 is an open, unlined channel that constitutes the primary plant drainage ditch (see Figure 1).

PRS 68 is the asphalt lined pond in the northeast corner of the site. The pond was constructed in the 1970s to receive stormwater runoff from the east central portion of the site to support reduction in suspended solids in runoff.

PRS 69 is the overflow pond and outfall pipe located at the south end of the drainage ditch. It is used to retain storm water flows, settle sediment, and support compliance with the National Pollutant Discharge Elimination System (NPDES) discharge standards for suspended solids. The pond is fed by two inlets, one being the PRS 67 drainage ditch and the other being a drainage structure (PRS 418) which was binned No Further Assessment. This PRS addresses only the stormwater sediment within the pond.

PRS 70 is also located at the south end of the drainage ditch (PRS 67) and consists of an open impoundment with earthen sides used to control the flow of water and settle sediment. The bottom is partitioned into three basins by concrete dividers. PRS 70 discharges into the weir basin. This PRS also includes the weir basin that moderates the flow so that the discharge volume can be measured.

Characterization. Several investigations have been conducted at or near the subject PRSs. Water and sediment samples have been collected and analyzed. All contaminants detected in the composited water samples were at concentrations less than applicable guideline values. The sediment sample results indicated exceedances to cleanup objectives (risk criteria), maximum results of which are presented in pCi/g in the table below.

Analyte	PRS	Maximum Result	Cleanup Objective
Plutonium-238	67	535	55
	68	257	55
	69	34	55
	70	749	55
Thorium-228	67	1.23	2.6
	68	9.44	2.6
	69	1.4	2.6
	70	1.27	2.6
Thorium-232	67	1.09	2.1
	68	0.44	2.1
	69	2.70	2.1
	70	1.57	2.1

1: Action Memorandum/Engineering Evaluation/Cost Analysis, Contingent Removal Action for Contaminated Soil, June 2002, Final
2: Standard Work Package for Contingent Removal Actions, November 2001, Final
3: Storm Water Pollution Prevention Plan

B1/2

The maximum sample result of the only chemical found above cleanup objective is benzo(a)pyrene (8.0 mg/kg vs. 4.1 mg/kg CO). Benzo(a)pyrene is present in urban environments as a result of incomplete combustion in motor vehicles and is a component of asphalt based products. Five sample results were above the cleanup objectives; four were located within the asphalt-lined pond (PRS 68) and one at the discharge pipe from the asphalt-lined pond.

The Core Team originally recommended Further Assessment for these PRSs. Subsequently, the Department of Energy determined that a **Removal Action** (RA) per the Contingent Action Memo[1] is appropriate based on results above COs. RA COCs are Pu-238, Th-232, and isolated instances of benzo(a)pyrene.

The **Work Plan** for Contingent Removal Actions[2], supplemented by the Unique Work Package, includes procedures, instructions, and applicable permits and notifications required to safely conduct the work. Erosion and runon/runoff controls will be managed per the SWP3[3].

The RA will consist of excavation of contaminated soil and sediment in areas indicated by sample results above the cleanup objectives and shipping this soil to an approved disposal facility. Post-excavation sampling will be performed within the excavations per a Core Team-approved **Verification Sampling & Analysis Plan (VSAP)**.

Schedule. This Fact Sheet will be in public review for 30 days, ending April 29, 2004. The RA is planned to begin in late summer 2004. As currently planned, removal activities for PRSs 67-70 will not begin until all upgradient contamination has been remediated. However if the removal of upgradient contamination is not completed by the time removal activities begin in PRSs 67-70, additional precautions such as supplemental sediment and silt controls will be put in place on all upgradient projects at the project perimeters to ensure that upgradient contamination does not re-comtaminate these PRSs. Subsequent confirmatory sampling at the appropriate outfalls into the drainage system will occur to ensure cross contamination did not take place. These precautions will be further specified within the Core Team approved Removal Work Plan and Verification Sampling Plan. A summary of the RA & the verification data will be included in the On-Scene Coordinator (OSC) Report. The OSC Report will be placed in the public reading room after the conclusion of the verification sampling and approval by the Core Team.

Expected excavation of approximately 3220 yd^3 (2460 m^3) with possible maximum excavation of 8730 yd^3 (6675 m^3) and verification are expected to cost less than $500,000.

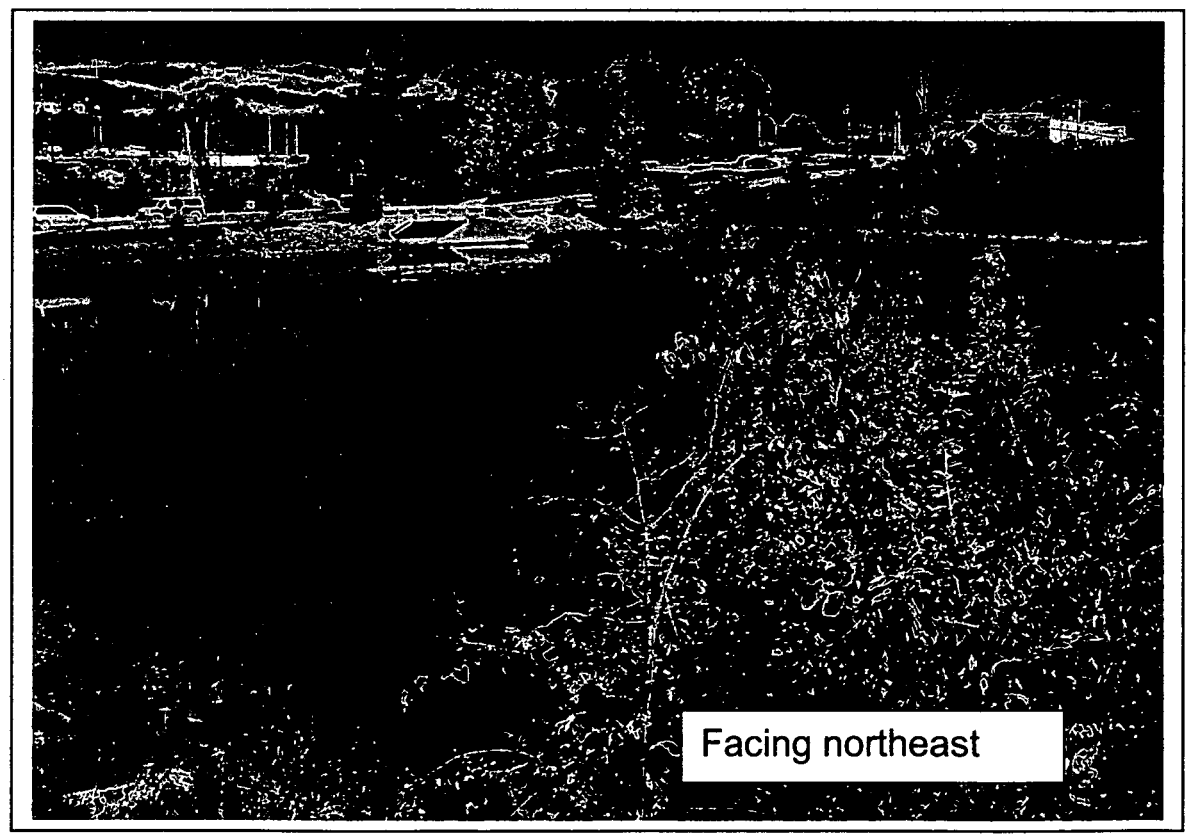
Additional information can be found in the public reading room, or by contacting Danny Punch at 847-8350 extension 301.

1: Action Memorandum/Engineering Evaluation/Cost Analysis, Contingent Removal Action for Contaminated Soil, June 2002, Final
2: Standard Work Package for Contingent Removal Actions, November 2001, Final
3: Storm Water Pollution Prevention Plan

ATTACHMENT C

PHOTOGRAPH DOCUMENTATION

Facing southeast


Facing northeast